Abstract

Flow-through shear analyser for biologically active molecules in liquid layers on surfaces

The adsorption rate of proteins from solutions on surfaces in the region of interface layers is often so large that a depletion of the protein in the interface layer results. Due to this, the total reaction becomes transport-dependent, sensitively disrupting the determination of the rate constants. In known TIRF-analysis chambers or bio-sensor systems with a liquid interface layer of ~ 10 µm thickness and mass transport coefficients of 10^{-6} - 10^{-5} m/s it has up to now been impossible to alleviate this transport limitation.

With the help of a TIRF-flow-through shear analyser in which a certain volume unit of an immiscible fluid, for example an air bubble, is fed into the buffer flow, an ultra-thin liquid layer arises on the surface with a thickness of 100-200 nm, wherein interface surfaces below 10 nm thickness are technically possible.

The new TIRF-flow-through shear analyser therefore allows the generation of ultra-thin liquid layers while increasing the mass transport coefficients for proteins by 50-100-fold so that the sorption rate constants can be determined without transport limitation.